



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/518,855	09/14/2005	Andrea Melloni	05788.0336	1247

22852 7590 02/26/2007  
FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER  
LLP  
901 NEW YORK AVENUE, NW  
WASHINGTON, DC 20001-4413

EXAMINER
----------

PEACE, RHONDA S

ART UNIT	PAPER NUMBER
----------	--------------

2874

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	02/26/2007	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/518,855	<b>Applicant(s)</b> MELLONI ET AL.	
	<b>Examiner</b> Rhonda S. Peace	<b>Art Unit</b> 2874	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 21-42 is/are pending in the application.  
     4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 21-26, 31-33, and 35-42 is/are rejected.
- 7) ☒ Claim(s) 27-30 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 December 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
     a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |  |
|--|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>12/21/2004, 9/14/2005</u> . | 6) <input type="checkbox"/> Other: ____  |

## DETAILED ACTION

### *Information Disclosure Statement*

The information disclosure statements (IDS) submitted on 12/21/2004 and 9/14/2005 were filed in compliance with the provisions of 37 CFR 1.97.

Accordingly, the information disclosure statements are being considered by the examiner.

### *Specification*

The abstract of the disclosure is objected to because it exceeds the maximum length as required by MPEP § 608.01(b). Correction is required.

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

*Claims 21-26, 31-33, and 35-42 are rejected under 35 U.S.C. 102(b) as being anticipated by Jin et al (US 5854802).*

*Pertaining to claims 21, 35, and 42, Jin et al discloses the use of a wavelength converter device 5 comprising the following (col. 5 lines 36-67, col. 6 lines 61, Fig 1):*

- An optical transmission path **12** coupled to input **14** for at least one signal radiation at frequency  $\omega_s$ ,

Art Unit: 2874

- A pump light source **22** for generating a pump radiation emitted from surface **52** with a frequency of  $\omega_p$ , where  $\omega_s \neq \omega_p$ ,
- An output for outputting converted radiation **26** at frequency  $\omega_g$ ,
- A structure **40** for transmitting the signal and pump radiations, wherein by propagating through the structure **40** the pump and signal radiation generate the converted radiation **26**, where structure **40** includes:
  1. a first optical resonator cavity **42** having nonlinear material **22** and resonating at the signal, pump, and converted frequencies, and
  2. a second optical resonator cavity **44**, coupled in series (or cascaded) to the first resonator **42**, and having nonlinear material **24**, and resonating at the signal, pump, and converted frequencies.

*Further pertaining to claims 21, 35, and 42, and additionally addressing claim 23*, Jin et al cites experimental data wherein the generated signal radiation is approximately 810 nm, the pump signal is approximately 1064 nm, the optical path length of the first resonator **42** is 1.5mm, and the optical path length of the second resonator **44** is 2.25 mm (col. 10 lines 17-45). Therefore, the first and second resonators **42** and **44** satisfy the condition that their length be greater than  $40 \cdot \lambda / 2$ , where  $\lambda$  is the wavelength of the pump radiation (532 nm), as this condition would require (for the given input data of Jin et al) that the resonators exceed 0.0213 mm. Moreover, the first and second resonators **42** and **44** additionally satisfy the limitation that their length be less than  $7500 \cdot \lambda / 2$ , where  $\lambda$  is the wavelength of the pump radiation (532 nm), as this condition would require

Art Unit: 2874

(for the given input data of Jin et al) that the resonators' lengths be less than 3.99 mm.

*Addressing claims 25 and 26*, Jin et al discloses the first resonator **42** is a Fabry-Perot *like* cavity bound by the partially reflecting mirrors **16** and **18**, and additionally, the second resonator **44** is a Fabry-Perot *like* cavity bound by the partially reflecting mirrors **18** and **20** (col. 5 lines 51-56).

*Pertaining to claims 31-33*, Jin et al discloses light source **10** (which is considered to be "an additional structure") is coupled in series to the cavities **42** and **44** (see Figure 1). Furthermore, a temperature control element **31** is placed between the light source **10** and the cavities **42** and **44** to compensate for any phase mismatch within the cavities **42** and **44** by adjusting the length of the cavities **42** and **44** (col. 9 lines 29-45).

*Concerning claims 40 and 41*, Jin et al, in addition to the above, further discloses an optical fiber may be used to couple the light source **10** to the resonator cavities **40** and **42** (col. 6 lines 16-24).

*With regard to claims 22, 24, and 36*, Jin et al also discloses the converted radiation 26 may be generated via four-wave mixing (col. 6 lines 61-67, and col. 7 lines 1-5). Moreover, each resonator **42** and **44** comprise reflectors (resonator **42** has reflectors **16** and **18**, and resonator **44** has reflectors **18** and **20**) having a power reflectivity of at least 0.5 (col. 7 lines 15-21, 28-35, and 47-51, Fig 1).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

Art Unit: 2874

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

*Claims 37-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jin et al (US 5854802) in further view of Frigo et al (US 5808764).*

*Addressing claim 37-39, Jin et al discloses the device 5 as described above. However, Jin et al does not disclose the use of device 5 within an optical*

Art Unit: 2874

network node, and further comprising such elements as a plurality of output ports coupled to an input port. Nonetheless, it is clear from the discussion of Jin et al that device 5 may be used to convert a given wavelength into a converted wavelength having a different frequency and wavelength from the initial wavelength. Frigo et al discloses a multiple star optical network comprising nodes 30 and 30'' capable of accepting an input signal, converting said input signal into first and/or second order modes, and outputting said first and/or second modes to a plurality of optical fibers 27 (col. 2 lines 66 and 67, and col. 3 lines 1-48). It would have been obvious to one of ordinary skill in the art to combine the teachings of Jin et al with those of Frigo et al, thereby utilizing the device of Jin et al in a network such as that of Frigo et al, as Jin et al discloses the device 5 is useful for such functions as those required by Frigo et al (Jin et al, col. 1 lines 19-36), and has excellent output stability, low noise, high efficiency, and is simpler and cheaper to manufacture when compared to the prior art (Jin et al, col. 2 lines 50-55).

***Allowable Subject Matter***

Claims 27-30 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: The applicable prior art does not disclose or reasonably suggest a wavelength converter having an input for a signal radiation at a first frequency, a pump source for generating a pump radiation at a second frequency, an output

Art Unit: 2874

for a converted radiation at a third frequency, where the converted radiation is generated by the signal and pump radiations via interaction with a non-linear material within a structure comprising two optical resonators, each resonator formed with a non-linear material within, and each resonator having an optical length less than  $40\lambda/2$ , where  $\lambda$  is the wavelength of the pump signal, and also each resonating at the pump, *and moreover each resonator resonating at the first, second, and third frequencies, and wherein the optical resonators are one of a micro-ring resonator, or photonic crystal waveguide.* The applicable prior art shows Fabry-Perot cavity to serve as the resonators in question, and does not suggest the use of the above mentioned resonator types.

### **Conclusion**


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rhonda S. Peace whose telephone number is (571) 272-8580. The examiner can normally be reached on M-F (8-5).


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rodney Bovernick can be reached on (571) 272- 2344. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.



Art Unit: 2874

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

  
Rhonda S. Peace  
Examiner  
Art Unit 2874

  
MICHELLE CONNELLY-CUSHWA  
PRIMARY EXAMINER  
2/20/07